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REMARKS

By this Amendment, Applicants have amended claim 7 to be in independent form by including therein all of the limitations of claim 11, from which claim 7 previously depended, and to clarify that the containment envelope is provided within the outer shell. See, e.g., Figure 3.

Since the foregoing amendments to claim 7 merely rewrite claim 7 in independent form and clarify an element of the invention already recited in claim 7, it is submitted the foregoing amendments do not raise new issues requiring further consideration and/or search. Moreover, the foregoing amendments place the application in condition for allowance for the reasons set forth hereinafter or, at least, in better form for consideration on appeal. Therefore, entry of this amendment under 37 CFR 1.116 is requested.

Claims 1 and 23 stand rejected under 35 U.S.C 102(b) as allegedly being anticipated by U.S. Patent No. 5,554,347 to Busson et al or U.S. Patent No. 5,270,016 to Alagy et al. Applicants traverse this rejection and request reconsideration thereof.

The present invention relates to a reactor device for carrying out chemical reactions requiring heat exchange. As shown, by way of example only in the figures, e.g., Figures 1 and 2, the reactor R is elongate along an axis XX' and has, at a first end, at least one means 16 for supplying at least one reactant, and, at an opposite end, at least one means 18 for evacuating effluents. A plurality of heat exchange means 12 are provided in the reactor R and they are separated by at least by internal partition 14 participating in controlling the residence time of the reactant or reactants and increasing the

heat exchange surface inside the reactor. Passages are provided for circulating the reactant or reactants and/or effluents between the heat exchange means 12 and the internal partitions 14. The reactor of the present invention has at least one enclosure 10 made of a refractory material ensuring heat insulation and containing the heat exchange means 12 and the internal partitions 14. The enclosure 10 is contained in an envelope 20 containing the reactant and/or reactants and/or effluents circulating inside the reactor.

The enclosure 10 can have a dual role. That is, it is a heat insulator to protect the outer containment envelop 20 of the reactor R and may have a shape generating the internal space necessary for its participation for controlling the flow and residence time of the fluid circulating in the reactor.

The '347 patent to Busson et al. discloses an apparatus comprising a reactor, elongated along one axis, preferably of square or rectangular cross section. The reactor has, at one extremity, at least one supply line for at least one reactant and at least one evacuation outlet at the other extremity for removal of produced effluents. In a first zone (near the first extremity of the reactor), a plurality of heat exchangers, substantially parallel to each other, are disposed in substantially parallel layers perpendicular to the reactor axis, thereby defining spaces or passages for circulation of reactant(s) and/or effluents between the heat exchangers and/or layers formed by the heat exchanger. The heat exchangers are adapted to exchange heat in the passages through successive transverse sections, which are independent and substantially perpendicular to the reactor axis. At least some of the heat

exchangers comprise a tubular element formed by at least one shell, supplied with a heat exchange gas or gas mixture, and at least one evacuation element for evacuating the circulating gas or gas mixture which has undergone heat exchange with the reactant(s) and/or effluents.

The Examiner alleges the Busson et al. '347 patent to teach the use of an enclosure as presently claimed. In this regard, the Examiner equates the projecting portion 12 of Busson et al. '347 to the presently claimed enclosure. However, in Busson et al. '347, it appears the projecting portions 12 are provided only on the inner surface of two opposite walls. See, Figures 1B and 1C. The two projecting portions 12, therefore, do not constitute an “enclosure.” An “enclosure” is defined as “something that encloses”; “enclose” is defined as “to surround on all sides.” The projecting portions 12 of Busson et al. '347, provided on only two side walls do not surround the heat exchange means and internal partitions on all sides in Busson et al. Therefore, the Busson et al. '347 patent does not disclose a reactor including the presently claimed enclosure.

The patent to Alagy et al. discloses an apparatus for a thermal conversion of methane. Figures 1A, 1B and 1C are longitudinal sections through a reactor in a plane perpendicular to the axis of the sheaths 4 surrounding the electrical heaters 3. In the case of Figure 1B, the reactor contains a lining. In the case of Figure 1C, it has wall separating successive sets of sheaths. Figures 1D and 1E are longitudinal sections through the reactor along the axis of the sheaths while Figure 2 illustrates a detail of the heating zone in the same plane as that in Figures 1B and 1E. Figure 1C

appears to show an arrangement similar to that in Busson et al. with walls 22 corresponding to the walls on projecting portions 11 and 12 in Busson et al. Figure 2 shows the detail of the embodiment in the heating zone of the same plane as that in Figures 1B and 1E. It is disclosed that the reactor can be made of rectangular cross section and the walls being made of insulating refractory concrete 14 and a metallic reinforcement 15. However, since Figure 2 shows only one of the two opposed side walls into which is passed the sheath 4, it is not clear that the concrete 14 forms an "enclosure," as presently claimed. Therefore, the Alagy et al. patent does not identically disclose the presently claimed invention and does not anticipate the present claims.

Claims 1, 3, 6, 10, 11, 13-16 and 21-23 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,027,635 to Busson et al. Applicants traverse this rejection and request reconsideration thereof.

The Busson et al. '635 patent discloses a reactor 40 divided into longitudinal rows 1-6 that are substantially parallel to its axis. These rows are separated from each other by nonimpermeable walls 70 which are of ceramic materials, the shape of which comprises cells adapted to encourage turbulence inside the row and thus to encourage the reaction. These rows contain sleeves of ceramic material 7 forming a layer which is substantially parallel to the reactor axis.

It is submitted the walls 70 of Busson et al. '635 do not constitute and "enclosure." As noted above, "enclosure" is defined as "something that encloses"; and "enclose" is defined as "to surround on all sides." It is

submitted the walls 70 of Busson et al. '635 are not disclosed to surround the inside of the reactor 40 on all sides. Accordingly, the Busson et al. '635 patent does not anticipate the presently claimed invention.

Moreover, it is submitted Busson et al. '635 does not disclose the reactor device set forth in independent claim 11 in which the enclosure is fitted to the containment envelope in such a way as to prevent gas bypasses between the outside of the enclosure and the inside of the envelope. Neither none of Busson et al. '347, Alagy et al. and Busson et al. '635 discloses the reactor device set forth in claim 23 in which the enclosure substantially covers all internal walls of the envelope. Accordingly, it is submitted none of Busson et al. '347, Alagy et al. and Busson et al. '635 anticipates the presently claimed invention.

Claims 2, 4, 5, 7-9, 11 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Busson et al. '635 in view of U.S. Patent No. 4,612,982 to Grehier et al. Claims 2, 4-9, 11 and 12 also stand rejected under 35 U.S.C. 103(a) as being unpatentable over Busson et al. '347 or Alagy et al. in view of Grehier et al. Applicants traverse these rejections and request reconsideration thereof.

The Examiner relies on the teachings of Grehier et al. only for demonstrating that heat transfer plates can be stacked into lattices to form a modular structure. However, clearly the Grehier et al. patent does not remedy any of the deficiencies noted above with respect to Busson et al. '635, Busson et al. '347 or Alagy et al.

Moreover, the Examiner's reference to aspects of the present invention

being "merely a matter of obvious engineering choice," etc. without providing any teachings in the prior art supporting these conclusions is not the type of objective evidence and specific factual findings necessary to support an obviousness rejection. *In re Lee*, 277 F3d 1338, 1342-44, 61 USPQ 2d 1430, 1433-34 (Fed. Cir. 2002).

With respect to claim 7, the Examiner alleges "it would have been obvious in view of the applied references to one having ordinary skill in the art to change the size and shape the shell (reactor wall) versus the envelope (12) to optimize the reaction zone. In addition, the court held that a change in size and shape is not patentably distinct over the prior art." In support of this, the Examiner cites a number of old decisions. In the first place, every claim must be considered as a whole. There can be no general rule that a change of size and shape does not patentably distinguish subject matter from the prior art. To the extent the Examiner alleges the cited cases to hold otherwise, the cases are inconsistent with the requirement that there must be motivation to modify or combine the prior art documents. See, e.g., *In re Fine*, 837 F.2d 1071, 5 USPQ 2d. 1596 (Fed. Cir. 1988); *In Vaeck*, 947 F.2d 488, 28 USPQ 2d. 1438 (Fed. Cir. 1991).

Moreover, the Examiner apparently misunderstands the limitations of claim 7 since claim 7 does not merely recite a change in size and shape. Rather, claim 7 recites the inclusion of an outer shell whose cross-section is substantially circular and whose inside diameters is substantially equal to the largest dimension of the outside diagonal of the containment envelope. One embodiment of a reactor device including an outer shell is shown in Figure 3

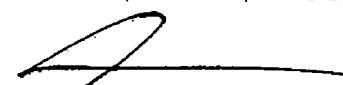
and described at page 12, lines 3-9 of Applicants' specification. As can be seen therein, the containment envelope 20 is provided within the outer shell 22. Such construction is useful for higher pressure operation, e.g., greater than 2 bars absolute. Thus, claim 7 does not merely recite a change of size or shape, but recites the inclusion of an additional element, i.e., the outer shell. The reactor device set forth in claim 7, including the outer shell is neither disclosed nor suggested by Busson et al. '635 or Grehier et al. Accordingly, claim 7 is patentable for this additional reason.

For the foregoing reasons, entry of this amendment and favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 612.41239X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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